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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/502,111

07/21/2004

Cheng C. Ko

10555-091

2109

7590

11/17/2006

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EXAMINER

TRAN, MINH LOAN

ART UNIT

PAPER NUMBER

2826

DATE MAILED: 11/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/502,111

Applicant(s)

CHENG KO

Examiner

Minh-Loan T. Tran

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.


- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 September 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) 15-19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-11,13 and 14 is/are rejected.
- 7) ☒ Claim(s) 2 and 12 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.


Minhloan Tran
Primary Examiner
Art Unit 2826

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 July 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 09/20/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election of Group I, claims 1-14 in the reply filed on 09/25/2006 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).
2. The Preliminary Amendment filed on 08/09/2004 has been entered.

Information Disclosure Statement

3. The Information Disclosure Statement filed on 09/20/2004 has been considered.

Oath/Declaration

4. The oath or declaration filed on 07/21/2004 is acceptable.

Drawings

5. The drawings filed on 07/21/2004 are acceptable.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 10 and 11 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification does not disclose the carbon-doped charge control layer is between 5 and 50 angstrom in thickness or 5 and 35 angstrom in thickness as recited in claims 10 and 11. Note that the specification only discloses the carbon-doped charge control layer is between 2 and 100 angstrom in thickness.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3-11, 13, 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe (5,654,578) in view of Metzger et al. (5,365,077).

With regard to claims 1, 6, 7, figure 5 of Watanabe discloses an avalanche photodiode 300 comprising a p-type InGaAs absorption layer 307 disposed on an n⁺-type InP substrate 301; a InAlGaAs/InAlAs multiplication layer 305 disposed on the substrate 301; and a p⁺-type InP charge control layer 306 disposed between the

absorption layer 307 and the multiplication layer 305. Note columns 13 and 14 of Watanabe.

Watanabe does not disclose the charge control layer is doped with carbon. However, Metzger et al. discloses a carbon can be used as an alternate dopant for forming p-type semiconductor layer. Note lines 50-56 in column 4 of Metzger et al. Therefore, it would have been obvious to one of ordinary skill in the art to dope the charge control layer 306 of Watanabe with carbon such as taught by Metzger et al. because carbon is less diffusion out of the semiconductor layer than does Be, so that the thin charge control layer can be obtained.

With regard to claims 3 and 13, figure 5 of Watanabe discloses an n-type InP contact layer 303 disposed between the multiplication layer 305 and the substrate 301.

With regard to claims 4 and 14, figure 5 of Watanabe discloses a p-type InP contact layer 308.

With regard to claim 5, figure 5 of Watanabe discloses a buffer layer 302 disposed between the n-type InP contact layer 303 and the substrate 301.

With regard to claim 8, figure 5 of Watanabe does not the charge control layer 306 is InAlAs. However, it would have been obvious to one of ordinary skill in the art to form the charge control layer 306 of Watanabe of InAlAs in order to reduce a lattice constant mismatch between the multiplication layer 305 and the charge control layer.

With regard to claims 9-11, figure 5 of Watanabe discloses the charge control layer 306 having a thickness of 500 angstrom, but it does not disclose the charge control layer having a thickness of 2 to 100 angstrom. However, although Watanabe

does not teach exact the thickness of the charge control layer as that claimed by Applicant, the thickness differences are considered obvious design choices and are not patentable unless unobvious or unexpected results are obtained from these changes. It appears that these changes produce no functional differences and therefore would have been obvious. Note *In re Leshin*, 125 USPQ 416, *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Circ. 1990).

Allowable Subject Matter

8. Claims 2 , 12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Minh-Loan T. Tran whose telephone number is (571) 272-1922. The examiner can normally be reached on Monday-Friday 9:00 AM-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Mlt
11/2006



Minh-Loan T. Tran
Primary Examiner
Art Unit 2826